HEALTH AND SAFETY PLAN

WAUKEGAN MANUFACTURED GAS AND COKE PLANT
WAUKEGAN, ILLINOIS

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1.0 GENERAL

Conestoga-Rovers & Associates (CRA) has prepared this Health & Safety Plan (HASP) to be implemented at the Waukegan Manufactured Gas and Coke Plant in Waukegan, Illinois (Site). The activities outlined in the Pilot Project Scope of Work (SOW) will involve drilling and sampling within the limits of the Site. While conducting these activities, CRA personnel may come in contact with soils, groundwater and debris which potentially contain hazardous materials. To ensure that any direct contact with potentially contaminated material by CRA Site personnel is minimized, this Site-specific Health and Safety Plan (HASP) was developed. Contractors and subcontractors shall develop HASPs which are specific to their SOW.

This HASP is designed to ensure the following:

i) that CRA's Site personnel are not adversely exposed to the compounds of concern as well as the physical and biological hazards present on Site;

ii) that public welfare or the environment are not adversely impacted by off-Site migration of contaminated materials due to work activities at the Site; and

iii) that CRA's operations, procedures and equipment at the Site will meet the requirements of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and the applicable subparts of 29 CFR 1926 and 29 CFR 1910.

For the purpose of this HASP, all pilot project activities carried out on Site involving contact with potentially contaminated materials will be considered contaminated operations requiring personal protective equipment (PPE). Similar activities occurring off Site are considered non-contaminated operations requiring a modified level of PPE from that for on-Site work.

All pilot project operations at the Site will be conducted in accordance with the provisions of the HASP. Cost and/or scheduling considerations will not be considered as justification for modifying this plan.

2.0 SITE CHARACTERIZATION AND HAZARD ANALYSIS

The Site is located in Waukegan, Illinois, on the peninsula separating Waukegan Harbor from Lake Michigan as depicted in Figure 1.1. Access to and egress from the Site can be obtained from Sea Horse Drive. A Site plan is provided as Figure 1.2.

The plant was built in 1928, operated through 1969, and was demolished in 1972. The soil and groundwater at the Site have been adversely impacted by past activities at the plant. The soil is contaminated with coal tar and arsenic. The groundwater contains elevated concentrations of arsenic, phenols, and ammonia.

A summary of the contaminants of concern and their related health effects are presented in Table 1 of this HASP.

The activities to be performed as part of the pilot project SOW will include:

- oversight of groundwater monitoring well installation;
- oversight of soil boring advancement;
- oversight of groundwater extraction/re-injection units construction;
- sampling activities; and
- operation and maintenance activities.

Risks associated with these activities will be minimized by implementing engineering controls, safe work practices, and the proper use of personal protective equipment. Table 2 summarizes the potential hazards associated with activities at the Site.

A hospital route map is provided on Figure 1.3.

3.0 BASIS

The Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, CFR, Parts 1910 and 1926 (29 CFR 1910 and 1926) including the amended sections in 29 CFR 1910.120 and current Recommended Exposure Limits (RELs) as provided by the National Institute for Occupational Safety and Health (NIOSH) provide the basis for this Health and Safety Plan. Some of the specifications within this section are in addition to OSHA regulations and reflect the positions of the United States Environmental Protection Agency (USEPA), the National Institute for Occupational Safety and Health (NIOSH) and the United States Coast Guard (USCG) regarding procedures required to ensure safe operations at potential hazardous waste sites.

The safety and health of the public and on-Site personnel and the protection of the environment will take precedence over cost and schedule considerations for all project work.

4.0 RESPONSIBILITIES AND ADMINISTRATION

The following individuals are designated to carry out stated job responsibilities related to this project.

-Project Manager:	Alan VanNorman
-Project Coordinator:	Bruce Clegg
-Project Geologist:	Steve Wanner
-Project Industrial Hygienist:	Matthew Lazaric

An on-Site individual shall be designated as the Site Health and Safety Officer (HSO). The HSO will supervise the implementation of the Health and Safety Plan and will make all decisions regarding operations and work stoppages due to health and safety considerations.

The responsibilities of the HSO are as follows:

i) be responsible for controlling and maintaining Site access;

ii) be responsible for implementation of the HASP at the initiation of Site work;

iii) conduct the pre-entry safety briefing for all on-Site personnel with regard to the HASP and other safety requirements to be observed during field work, including:

   a) potential hazards,

   b) personal hygiene principles,

   c) personal protective equipment,

   d) respiratory protection equipment usage, and

   e) emergency response procedures.

iv) be responsible to hold two "tailgate" meetings to discuss health and safety issues during each part of the days work;

v) review and modify the HASP as more information becomes available concerning the hazardous materials involved;

vi) supervision and enforcement of safety equipment usage;

vii) supervision and inspection of equipment cleaning;

viii) personnel training in safety equipment usage and emergency procedures;

ix) monitoring of the health and safety program under direction of an industrial hygienist;

x) suspend work activity if unsafe working conditions develop;

xi) inform workers of the nature of chemical exposure risk as required by the "Right-to-Know" Law;

xii) recommend a medical examination when a worker appears to require it;

xiii) coordination of the Emergency Response Plan;

xiv) assure that safety equipment is provided, maintained and accessible to Site personnel;

xv) maintain a log with a sign in/out sheet for personnel performing activities and visitors entering the Site;

xvi) assure that workers comply with the "buddy system" while working on Site; and,

xvii) investigate all accidents, injuries, illnesses, spills, fires, incidents, and near misses.

5.0 MEDICAL SURVEILLANCE

In accordance with requirements detailed in 29 CFR 1910.120(f), all Site personnel (including contractors and/or subcontractors) who may be exposed to potentially contaminated materials will have received, within one year prior to starting field activities, medical surveillance by a licensed physician or physician's group.

Medical records for all on-Site personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

Each employer will ensure that its personnel involved in on-Site work will have all necessary medical examinations prior to commencing work which requires respiratory protection or exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to on-Site activity or when accidental exposure to elevated concentrations of contaminants occurs.

6.0 TRAINING

All Site personnel are required, prior to entering the Site, to complete training sessions in accordance with 29 CFR 1910.120(e). This training shall consist of a minimum of 40 hours of instruction off Site and three days of actual field experience under the direct supervision of a trained, experienced supervisor. Each employer will maintain documentation stating that its on-Site personnel have complied with this regulation.

Prior to commencing Site activities, a Site-specific pre-entry safety briefing will be conducted. Topics covered during the pre-entry safety briefing will include:

i) Site-specific health and safety hazards;

ii) level of PPE required;

iii) safe use of equipment;

iv) decontamination procedures; and

v) emergency response procedures.

All personnel who attend this briefing will sign the Health and Safety Plan Acknowledgment Form presented as Appendix A.

All personnel working on Site shall attend two regular safety ("tailgate") meetings. These meetings will be conducted by the HSO, and will cover specific health and safety issues, Site activities, changes in Site conditions, and a review of topics covered in the Site-specific pre-entry briefing. Topics discussed in the safety meetings will be documented along with the signatures of personnel who attend.

7.0 WORK AREAS

Specific work areas, as defined below, will be delineated by temporary fencing or a flagged line.

a) Exclusion Zone (EZ) - This zone will include all areas where potentially contaminated soils or materials are to be handled and all areas where contaminated equipment or personnel travel.

b) Contaminant Reduction Zone (CRZ) - This zone will occur at the interface of the EZ and Support Zone and will provide access for the transfer of construction materials and Site equipment to the EZ, the decontamination of vehicles prior to leaving the EZ, the decontamination of personnel and clothing prior to entering the Support Zone, and for the physical segregation of the Support Zone and EZ.

c) Support Zone (SZ) - This area is the portion of the Site defined as the area outside the zone of significant air and soil contamination. The Support Zone will be clearly delineated and procedures implemented to prevent active or passive migration of contamination from the work Site.

8.0 PERSONAL PROTECTIVE EQUIPMENT

Engineering controls and work practices designed to reduce and maintain employee exposure at or below the permissible exposure limits (PELs) for the contaminants of concern will be implemented. Whenever engineering controls and work practices are not feasible, a reasonable combination of engineering controls, work practices and PPE shall be used to reduce and maintain employee exposure at or below the permissible exposure limits for the contaminants of concern.

All on-Site personnel shall be equipped with PPE appropriate for the nature of work being completed. All safety equipment and protective clothing shall be kept clean, well-maintained, and intact.

Safety equipment and apparel as required will be Level D, Modified Level D and Level C personal protective equipment (as determined by the action levels set forth in Section 9.0) within the Exclusion Zone.

Level D PPE

Type	*Properties*	*Item*
Foot protection	Steel-toe/reinforced shank	Boots
Head protection	Meets ANSI Z89.1 standard	Hard hat
Hand protection	Puncture/tear resistant	Leather/cotton gloves
Eye protection	Meets ANSI Z87.1 standard	Glasses/goggles with side shields

Modified Level D PPE

Type	*Properties*	*Item*
Foot protection	Steel-toe/reinforced shank	Boots
Foot protection	Chemical resistant (latex)	Overboots
Head protection	Meets ANSI Z89.1 standard	Hard hat
Hand protection	Chemical resistant (nitrile)	Inner gloves
Hand protection	Chemical resistant, puncture/ tear resistant (nitrile)	Outer gloves
Eye protection	Meets ANSI Z-87.1 standard	Glasses/goggles with side shields
Body protection	Chemical resistant (tyvek)	Coverall

Level C PPE

Type	*Properties*	*Item*
Foot protection	Steel-toe/reinforced shank	Boots
Foot protection	Chemical resistant (latex)	Overboots
Head protection	Meets ANSI Z89.1 standard	Hard hat
Hand protection	Chemical resistant (nitrile)	Inner gloves
Hand protection	Chemical resistant, puncture/ tear resistant (nitrile)	Outer gloves
Eye protection	Meets ANSI Z87.1 standard	Glasses/goggles with side shields
Body protection	Chemical resistant (tyvek)	Coverall
Respiratory protection	NIOSH approved	Full-face air- purifying respirator with organic vapor/acid gas/HEPA filter

Additional protective equipment guidelines to be implemented include:

i) prescription eyeglasses in use on the Site will be safety glasses with side shields;

ii) contact lenses will not be permitted on the site;

iii) protective gloves (leather palm) will be worn over nitrile gloves by Site personnel involved in any drilling activities;

iv) during periods of respirator usage, respirator cartridges and filters will be changed daily, or upon breakthrough, whichever occurs first;

v) on-Site personnel who have not passed a respirator fit test will not be permitted to enter or work in the Exclusion Zone;

vi) personnel required to wear a respirator will not be permitted to have beards, or long sideburns or mustaches that interfere with the proper fit of the respirator;

vii) all PPE worn on Site will be decontaminated or discarded at the end of each work day;

viii) duct tape will be used to ensure that disposable coveralls and gloves are tightly secured when personnel are working within the Exclusion Zone; and

ix) no watches or other accessories will be permitted during drilling and sampling activities; rings are not allowed in the plant.

9.0 RESPIRATOR PROGRAM

Prior to arriving at the Site, all on-Site personnel will have received training in the use of, and have been fit tested for a full-facepiece respirator. Companies employing individuals required to perform intrusive work at the Site shall have a written respiratory program that complies with 29 CFR 1910.134.

During intrusive activities, a photoionization detector (PID) will be used to determine if organic vapors and some inorganic gases are present in the breathing space. A background reading will be established prior to commencing work activities at each work location.

Sustained (greater than 5 minutes) vapor readings to determine the level of respiratory protection necessary during field activities will be:

Sustained Photoionization Organic Vapor Reading Above Background	*Protection Level*
0 - 1 ppm	Level D
1 - 25 ppm	full-facepiece air purifying respirator (Level C)
>25 ppm	shut down activities

Work will be stopped and the work area will be allowed to vent if monitoring indicates that any of the following conditions exist:

i) organic vapors are present at concentrations which present Immediate Danger to Life and Health (IDLH) conditions, or in excess of the protection factor afforded by the air purifying respirator (whichever is lower);

ii) the oxygen content of the air is less than 19.9 percent or above 21.0 percent;

iii) organic vapor concentrations in the breathing zone exceed 25 ppm;

Air monitoring should continue, at a safe distance, if operations are stopped due to action level exceedences, to determine if a threat to the surrounding community exists.

Any changes to the protection level will be communicated to the HSO prior to continuation of the work.

10.0 JUSTIFICATION

These action levels assume that all NIOSH criteria for using an air purifying respirator (APR) have been met. An APR can typically be worn in concentrations of up to 50 times the TLV for a given contaminant. All of the contaminants of concern have TLVs or PELs higher than 1 ppm. Because of differences in sensitivities with direct reading instruments, a 50 percent safety factor is included when determining action levels. Therefore, the calculation to determine when a respirator could no longer be used would be:

1 ppm (TLV) x 50 (protection factor) x 0.5 (50% safety factor) = 25 ppm

The primary routes of exposure of contaminants to individuals performing field investigative tasks include direct contact, ingestion and inhalation. The risk of exposure due to direct contact and ingestion will be minimized through the proper use of PPE as described in Section 8.0 and by exercising ordinary caution during sampling activities. In order to minimize exposure by the inhalation pathway, the respirator and air monitoring programs discussed in Sections 9.0 and 12.0 will be undertaken.

11.0 PERSONAL HYGIENE

All personnel performing or supervising work within the Exclusion Zone shall adhere to the personal hygiene-related provisions of this section.

On-Site personnel found to be disregarding the personal hygiene-related provisions of this HASP will, at the discretion of the HSO, be barred from the Site.

The following equipment/facilities shall be available for the personal hygiene of all on-Site personnel:

i) suitable disposable outerwear, gloves, respiratory protection and footwear on a daily basis for the use of on-Site personnel;

ii) disposal containers for used disposable outerwear; and

iii) potable water and a suitable sanitation facility.

The following regulations for personnel actively participating in the field sampling program shall be enforced:

i) on-Site personnel will wear appropriate PPE when in the Exclusion Zone;

ii) used disposable outerwear will not be reused if deemed to be unsuitable to provide the necessary protection, and when removed, will be placed inside disposal containers provided for that purpose;

iii) smoking, eating and drinking will be prohibited within the Exclusion Zone. These activities will be permitted only within designated areas; and

iv) on-Site personnel will thoroughly cleanse their hands, face, neck area and other exposed areas before smoking, eating or drinking and before leaving the Site.

12.0 AIR MONITORING

During the progress of intrusive work, air quality will be monitored on a continuous basis. During non-intrusive work air monitoring will be conducted on a periodic basis.

The air monitoring program will consist of monitoring with a PID for organic vapors in the breathing space. Operation and calibration procedures will be according to manufacturers' instructions. Calibration and maintenance records will be kept in the field log.

Identification of volatile organic vapor or particulate levels in excess of the action levels cited in Section 9.0 shall be reported to the HSO who will determine when PPE should be upgraded or operations be shut down and restarted.

If work is stopped because action levels have been exceeded, air monitoring will continue from a safe distance to determine if there is a threat to the surrounding community.

13.0 COMMUNICATIONS

Emergency numbers including the police department, fire department, ambulance, hospital and appropriate Regulatory agencies (Table 3) will be prominently posted near the Site telephone(s). In the event of an emergency, Outboard Marine Corporation's (OMC's) on-duty guard will be notified to coordinate necessary emergency response actions with the plant.

Prior to initiating Site activities, the route to the emergency medical facility will be verified to ensure preparedness to respond to any Site-related injuries.

14.0 EMERGENCY AND FIRST AID EQUIPMENT

Safety equipment will be available for use by Site personnel and will be located and maintained on Site. The safety equipment will include, but is not limited to, the following:

i) a portable emergency eye wash;

ii) one ABC type dry chemical fire extinguisher; and

iii) a first-aid kit for a minimum of 10 personnel.

15.0 EMERGENCY RESPONSE PLAN

Prior to commencing work, an emergency contingency plan shall be developed. The plan is intended to provide immediate response to a serious Site occurrence such as injury, explosion or fire. A list of emergency contact numbers is presented as Table 3 of this HASP. A hospital route map is provided in Figure 1.3.

In the event of injury to on-Site personnel, the following protocol will be followed:

i) notify the Health and Safety Officer;

ii) evacuate all personnel upwind;

iii) exit Site;

iv) notify the OMC's guard on duty to coordinate contact the designated hospital and describe the injury;

v) decontaminate personnel if possible, and administer appropriate first aid. If personnel cannot be decontaminated, alert hospital to possible problems of contamination; and

vi) transport personnel to the medical facility along a predefined route.

16.0 EQUIPMENT AND PERSONNEL DECONTAMINATION

During the initiation of the pilot project program, procedures will be implemented to reduce the amount of contact of both personnel and equipment with potentially contaminated materials. These procedures include the following:

i) proper work practices that will lead to minimal direct contact with potentially contaminated material; and

ii) use of disposable equipment and clothing as much as practicable.

All equipment used for the collection of samples for chemical analysis will be cleaned according to the following protocol:

- wash and scrub with low phosphate detergent;
- tap water rinse and steam clean;
- thorough rinse with deionized distilled water;
- air dry; and
- wrap in aluminum foil for transport.

Tap water may be used from any municipal water treatment system. The use of an untreated potable water supply is not an acceptable substitute.

All cleaned equipment will be placed on polyethylene sheeting or aluminum foil in order to avoid contacting a contaminated surface before use.

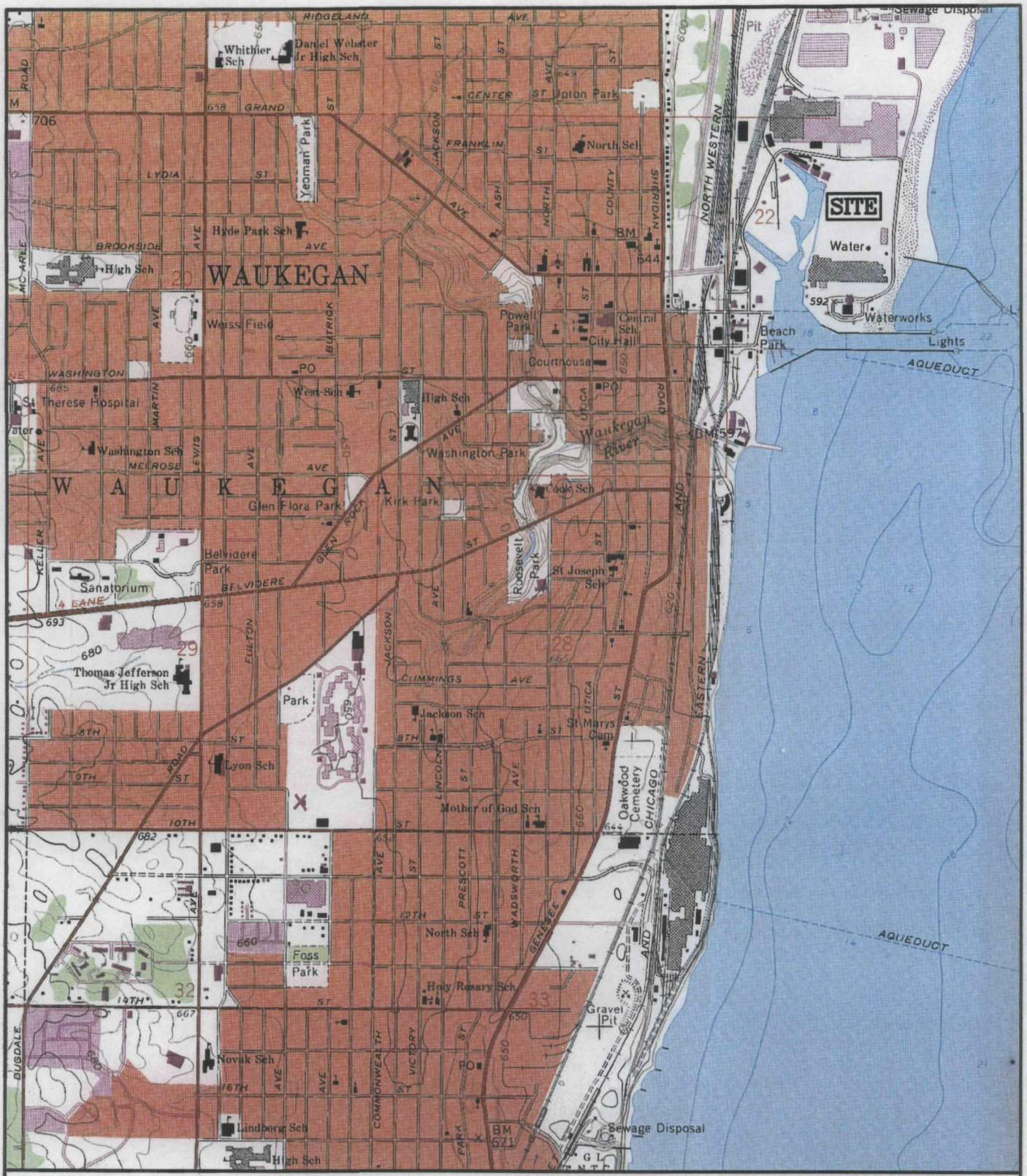
All personnel will remove their protective clothing and wash their hands, face, neck area and other exposed areas before entering the lunch and break areas to eat, drink or smoke.

17.0 CONTAMINATION MIGRATION CONTROL

All vehicles and equipment used within the Exclusion Zone will be decontaminated on Site as determined necessary by the HSO prior to leaving the Site. Decontamination, when required, will consist of the thorough cleaning of those parts of the equipment which come in contact with potentially contaminated material. The HSO will certify that each piece of equipment is clean or has been decontaminated prior to removal from the Site.

Personnel engaged in vehicle decontamination will wear protective equipment including suitable disposable clothing, respiratory protection and face shields.

FIGURES



BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE; WAUKEGAN, ILLINOIS 1960

figure 1.1

SITE LOCATION
WAUKEGAN COKE PLANT
Waukegan, Illinois

CRA

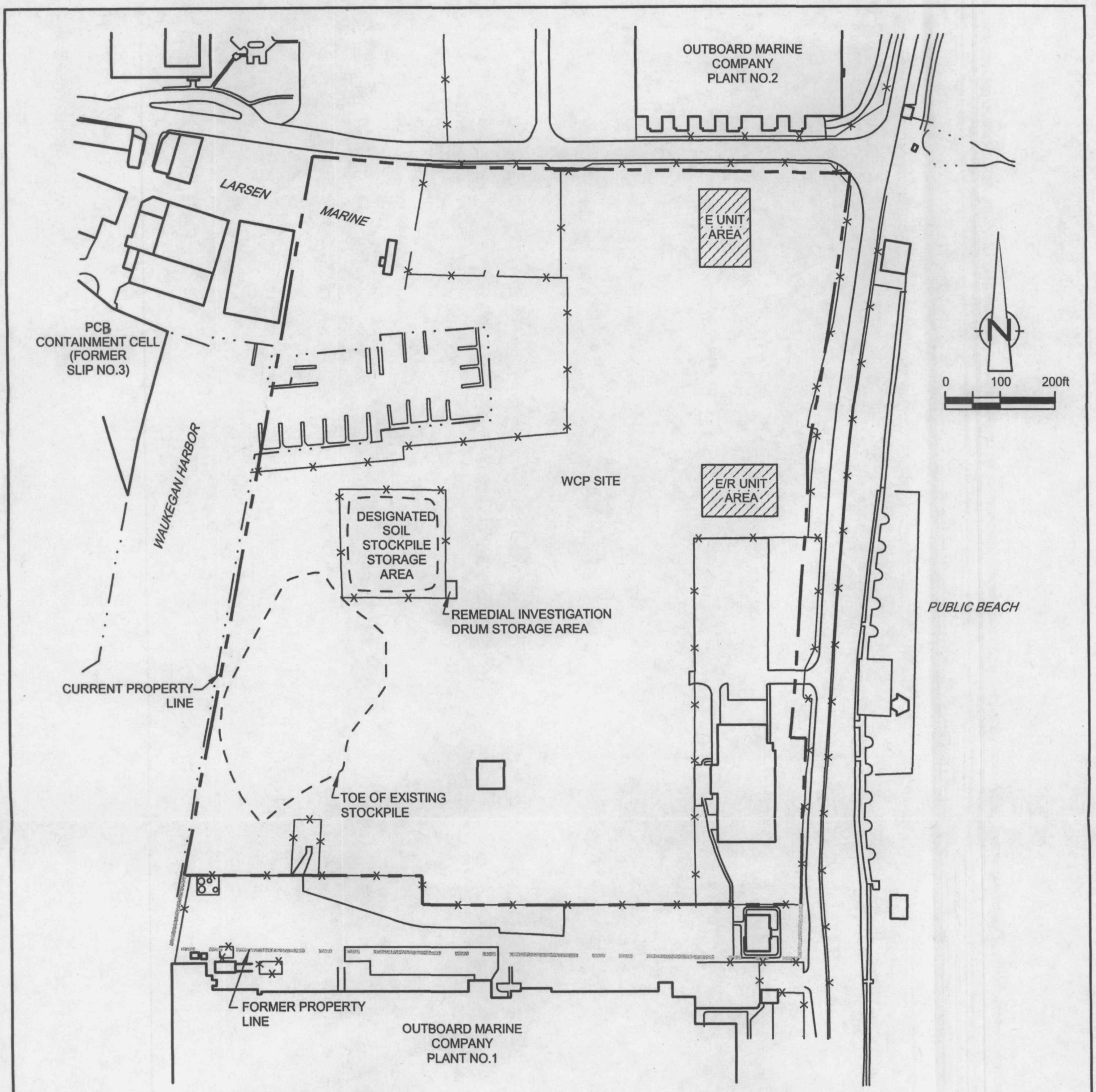
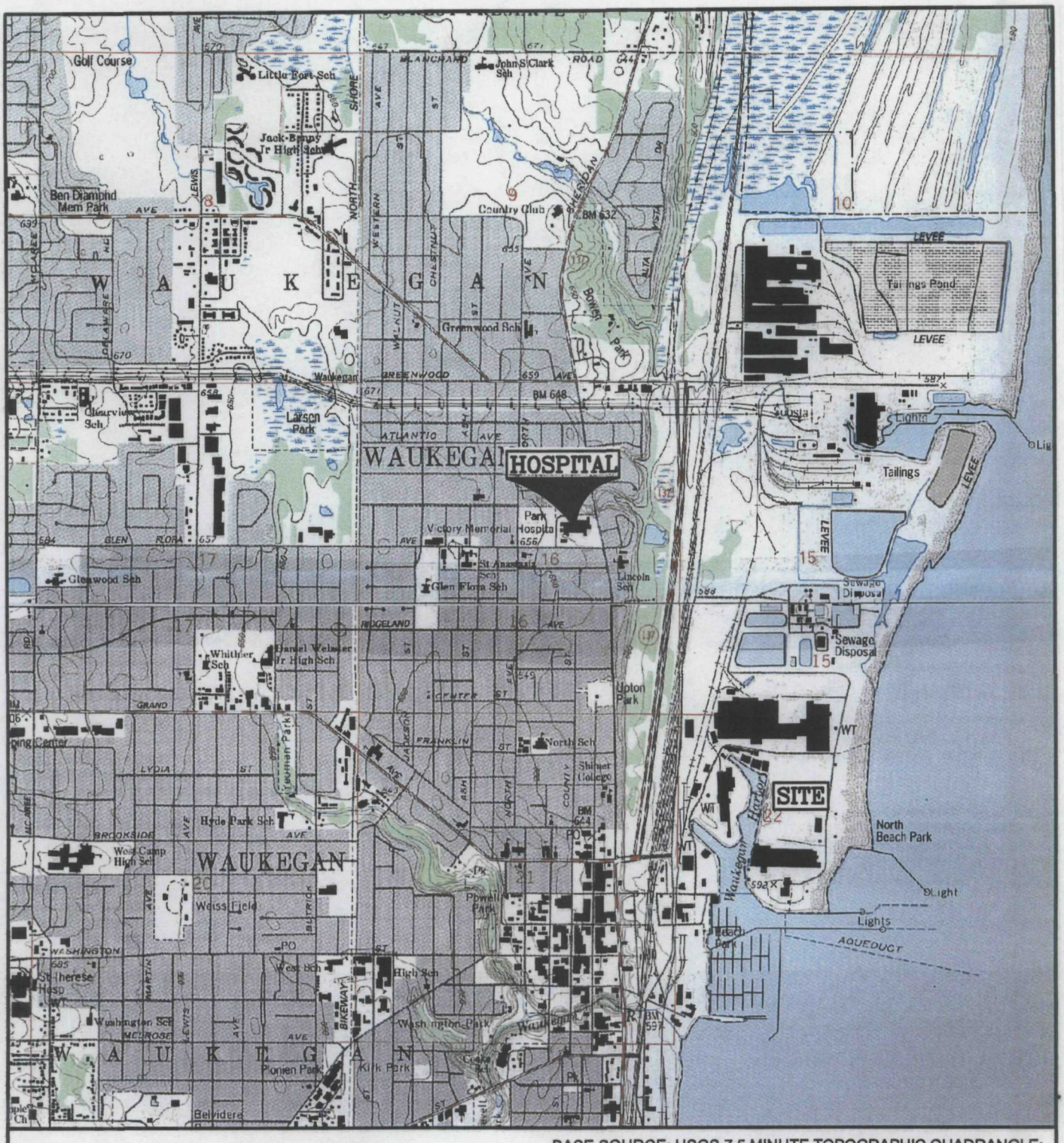


figure 1.2

SITE PLAN
WAUKEGAN MANUFACTURED GAS AND COKE PLANT
Waukegan, Illinois



BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE; WAUKEGAN, ILLINOIS 1960

DIRECTIONS TO THE HOSPITAL
FROM THE SEA HORSE DRIVE TURN RIGHT ONTO E. CLAYTON STREET (0.1 miles)
TURN RIGHT ONTO PERSHING ROAD (0.1 miles)
TURN LEFT ONTO MATHON DRIVE. (0.2 miles)
TURN RIGHT ONTO N. SHERIDAN ROAD (1.0 miles)

Hospital name + telephone #

figure 1.3

HOSPITAL ROUTE MAP
WAUKEGAN MANUFACTURED GAS AND COKE PLANT
Waukegan, Illinois

CRA

15670-00(004)GN-CO003 JUL 03/2000

TABLES

TABLE 1

CONTAMINANTS OF CONCERN
WAUKEGAN MANUFACTURED GAS AND COKE PLANT
WAUKEGAN , ILLINOIS

Contaminant	*REL*	*PEL*	*IDLH*	*IP (eV)*	*Flammability Range*	*Routes of Exposure*	*Symptoms of Exposure*	*Other*
Arsenic	0.002 mg/m3	0.010 mg/m3	5 mg/m3	NA	NA	Inhalation, Ingestion, Contact	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin	Potential occupational carcinogen
Ammonia	25 ppm	50 ppm	300 ppm	10.18	15% - 28%	Inhalation, Ingestion, Contact	Eye, nose and throat irritant; dyspnea; broncospasm; chest pain; pulmonary edema; pink frothy sputum; skin burns; vesiculation; and frostbite	None
Cyanide	5 mg/m3	5 mg/m3	25 mg/m3	NA	NA	Inhalation, Ingestion, Contact	Eye, skin and upper respiratory system irritant; asphyxia; weakness; headache; confusion; vomiting; thyroid and blood changes	None
Phenol	5 ppm	5 ppm	250 ppm	8.5	1.8% - 8.6%	Inhalation, Ingestion, Contact	Eye, nose and throat irritant; anorexia; weight loss; weakness; muscle aches; pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor; convulsions and twitching	None

NA - Not Applicable
REL - Recommended Exposure Limit
PEL - Permissible Exposure Limit
IDLH - Immediate Danger to Life and Health
IP - Ionization Potential
ppm - parts per million
mg/m3 - milligrams per cubic meter
eV - electron volts

TABLE 2

SITE HAZARD ANALYSIS
WAUKEGAN MANUFACTURED GAS AND COKE PLANT
WAUKEGAN , ILLINOIS

Site Activities	*Hazards*	*Prevention*
Soil Boring Advancement and Monitoring Well Installation Oversight	Chemical hazards due to inhalation and dermal contact	Proper use of PPE
	Exposure to temperature extremes	Monitor for heat or cold stress
	Physical hazards associated with operation of drilling equipment	Maintain a safe distance from equipment
		Avoid overhead power lines (20 feet)
		Check and mark underground utilities
	Physical hazards including steep grades and unstable surfaces while transporting heavy equipment	Use "buddy system" during Site activities
	Biological Hazards	Proper PPE, exercising ordinary caution, use of buddy system during Site activities
	High noise level	Use hearing protection
	Slip, trip, fall	Clean mud, snow or grease from shoes and equipment
Sampling Activities	Exposure to temperature extremes	Monitor for heat or cold stress
	Physical hazards including steep grades and unstable surfaces	Use "buddy system" during Site activities
	Biological Hazards	Proper PPE, exercising ordinary caution, use of buddy system during Site activities
O&M Activities	Chemical hazards due to inhalation and dermal contact	Proper use of PPE
	Exposure to temperature extremes	Monitor for heat or cold stress
	Physical hazards including steep grades and unstable surfaces	Use "buddy system" during Site activities
	Biological Hazards	Proper PPE, exercising ordinary caution, use of buddy system during Site activities

TABLE 3

EMERGENCY CONTACTS
WAUKEGAN MANUFACTURED GAS AND COKE PLANT
WAUKEGAN, ILLINOIS

Agency/Firm	*Emergency Telephone Number*	*Business Telephone Number*
Local Emergency Services		
Fire Department	911	
Police Department	911	
Ambulance	911	
Hospital (Victory Memorial) 1324 North Sheridan Road Waukegan, IL 60085		(847) 360-3000
Illinois Emergency Services & Disaster Agency		(800) 782-7860
National Poison Center		(800) 942-5969
National Response Center		(800) 424-8802
CRA Industrial Hygiene		
- Chicago (Matthew Lazaric)		(773) 380-9933
- Corporate (Mitch Bergner)		(651) 639-0913
CRA Project Manager		
- Alan Van Norman		(773) 380-9933
CRA Project Coordinator		
- Bruce Clegg		(773) 380-9933

Directions to the Hospital: From Sea Horse Drive turn right onto E. Clayton Street (0.1 miles)
Turn right onto Pershing Road. (0.1 miles)
Turn left onto Mathon Drive. (0.2 miles)
Turn right onto N. Sheridan Road (1.0 miles)

APPENDICES

APPENDIX A

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT FORM

APPENDIX A

HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT FORM

The following employees have read and understood the attached Health and Safety Plan:

Name	*Employer*	*Date*

APPENDIX B

RESPIRATORY PROTECTION PROGRAM

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1.0 RESPIRATORY PROTECTION

1.1 PRACTICE

The primary control of respiratory hazards shall be accomplished, whenever feasible, through the use of engineering controls, hazard substitution, revised work practices or other administrative controls. However, when such controls are not feasible, appropriate respiratory protection shall be used in accordance with the procedures established in this SOP. Any deviation from the requirements set forth must have approval from an IH.

1.1.1 AUTHORIZATION

Employees requiring respiratory protection must have authorization from an IH. Office management shall notify an IH of respirator needs. The work situation will then be assessed and a respirator will be issued based on the hazard(s) the individual is exposed to. Reassessment of the hazard and the individual's needs will be repeated periodically.

1.1.2 MEDICAL SURVEILLANCE

All personnel designated to use respirators must successfully complete a physical exam as part of the medical requirements placed on persons exposed to hazardous substances and for users of respiratory protection (29 CFR 1910.134 and 1910.120). The medical exam will be repeated annually. All medical data will be reviewed by a consulting occupational physician. The physician will generate a written opinion on the suitability of the employee to wear a respirator.

1.1.3 AIR QUALITY

When air supplied respirators are used, the breathing air shall meet the Compressed Gas Association (CGA-CG7.1) Standards for Grade D breathing air or better.

1.1.4 AIR CYLINDERS

Cylinders used to supply breathing air are tested and maintained as prescribed in Shipping Container Specifications (49 CFR 178). SCBA cylinders are approximately

2400 psi pressure when full. Compressed air cylinders are visually inspected annually and hydrostatically tested once every five years for steel cylinders and once every three years for composite cylinders. These test dates are stamped on the cylinder for future reference.

1.2 FIT TESTING

1.2.1 QUALITATIVE OR QUANTITATIVE FIT TESTING

Fit testing of the respirator will be conducted by an IH or other designated, trained personnel following the medical evaluation. All users of respirators must be fit tested to assure proper protection. Only the brand and size a person is fitted for is allowed to be used in the field. DO NOT SUBSTITUTE RESPIRATORS FOR A BRAND AND SIZE THAT YOU HAVE NOT BEEN PROPERLY FITTED FOR. The fit test will be accomplished quantitatively for full face APRs. After fit testing, the employee will be issued an authorization card. This card serves as a reference for the proper type of respirator to use as well as prima facie proof of proper medical and training clearance for regulatory purposes.

1.2.2 POSITIVE & NEGATIVE FIT TESTING

All personnel will be instructed in the proper method of testing respirator fit by use of the **Positive & Negative** pressure test. This test is to be done by the user each and every time a respirator is donned. This test is performed to help the wearer assess respirator function and find gross leaks between the face and facepiece. This positive-negative pressure test checks the presence and functioning of the respirator valves as well as leakage that may occur due to improper cartridge seal or respirator face fit.

1.2.2.1 POSITIVE PRESSURE

1) Block off the exhalation valve cover openings.

   MSA: Exhalation valve cover can be blocked with the palm of the hand.

   Scott: Exhalation valve covers have front openings as well as four small side openings. These openings are difficult to block off with the hands. However, a small piece of flexible material such as Saran wrap or latex can be used.

North: Exhalation valve cover has long narrow openings around its perimeter. These can be blocked by encircling the fingers around the valve cover.

2) The person exhales gently, creating a slight positive pressure within the facepiece. The positive pressure should be maintained for at least 10 seconds.

3) If no outward leakage is detected, the person has passed the test.

4) If leakage is detected (usually felt as a cool sensation against the skin or a loss of pressure), the respirator is either malfunctioning or a gross leak between the face and facepiece is present. The following should be done when a failure occurs: Re-don or readjust the respirator.

If the facepiece continues to lose pressure, although previous positive or negative pressure tests performed with that respirator had passed, it is probably malfunctioning. Consult Industrial Hygiene. It is also possible that there are new scars or wrinkles, beard growth, missing teeth or dentures, significant weight gain or loss, etc. to cause gross leakage into the facepiece. When such new conditions exist, reevaluation of the respirator in a test atmosphere is necessary.

1.2.2.2 NEGATIVE PRESSURE

1) Block off the respirator cartridge inlet openings.

MSA: Cartridges can be blocked with the palms of the hands or with disposable latex gloves.

Scott: Cartridges can be blocked by using the palms of the hands or with gloves.

North: Cartridges can be blocked only with gloves.

2) Inhale gently, holding the negative pressure for at least 10 seconds.

3) If no inward leakage of air is detected, the person has passed the test.

4) If leakage is detected, see 4 above.

1.2.3 EXCEPTIONS

1.2.3.1 FACIAL HAIR

Any individual with facial hair which protrudes into the sealing surface of the masks will be refused fitting. Fitting, issuance and use will be based on clean shaven faces only. Employees with facial hair which interferes with respirator fit are not permitted to work at sites where respiratory protection must be worn.

1.2.3.2 GLASSES

Employees who wear prescription glasses and must wear a full face respirator shall be fitted with special eyeglass adapters. Contact lenses are not permitted to be worn with any type of respiratory protection.

1.3 TRAINING

Proper training of respirator users is required to insure that all respirators will provide adequate protection against respiratory hazards and so that the user will understand the device's limitations. The training will include the following elements:

1) An explanation of the nature of respiratory hazards and what may happen if the respirator is not used properly.
2) A description of what engineering and administrative controls may be utilized to reduce the effects of the respiratory hazard and why respirators are required.
3) An explanation of the various types of respirators and why specific types have been selected.
4) A discussion of the function, capabilities and limitations of respirator cartridges.
5) Instruction in the inspection, fit and maintenance of the respirator.
6) Instructions in recognizing and handling emergency situations.

1.4 MAINTENANCE AND CARE OF RESPIRATORS

A program for the maintenance and care of respirators will include the following:

1) Inspection for defects;

2) Cleaning and disinfecting;

3) Repair/miscellaneous maintenance; and

4) Storage.

1.4.1 INSPECTION FOR DEFECTS

Employees shall inspect their respirators before each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in satisfactory condition. SCBA shall be inspected monthly if kept for emergency response (i.e., long duration site remediation).

Inspection shall include a check of the tightness of the connections and the condition of the face piece, headbands, valves, breathing tubes and canisters. Rubber or elastic parts shall be inspected for pliability and signs of deterioration. Any respirator with worn or defective parts will be immediately taken out of service.

Before and after each use, respirators will be inspected for the following:

1) Tightness of connections and condition of the facepiece;

2) The headstraps or head harness should be examined for: breaks, loss of elasticity, broken or malfunctioning buckles and attachments, and excessively worn head-harness serrations that might permit slippage;

3) Valves and valve seats;

4) Connecting tube and canisters, air or oxygen cylinders;

5) Rubber or elastomer parts for pliability and deterioration; and

6) Regulators, fittings and gauges.

The following contains inspection information for various types of respirators.

Air Purifying Respirators

1) Check rubber facepiece for dirt, pliability of rubber, deterioration and cracks, tears, holes or distortion from improper storage.

2) Check straps for breaks, tears, loss of elasticity, broken snaps and proper tightness.

3) Check valves (exhalation and inhalation) for holes, warpage, cracks, etc. After removing its cover, the exhalation valve should be examined for: foreign material, distortion, defective or missing valve cover or improper installation of valve into the valve seat.

4) Check filters or cartridges for dents, corrosion, etc. (loose or missing gaskets, improperly seated cartridges).

5) Check for cracked or badly scratched lenses in full facepieces; incorrectly mounted lens, broken or missing mounting clips.

Atmosphere-Supplying Respirators

1) Check appropriate items above.

2) Check air supply system for breaks or kinks in supply hoses and detachable coupling attachments.

3) Follow manufacturer's recommendations for the specific equipment.

4) Check air supply level and warning devices.

1.4.2 CLEANING AND DISINFECTING

The respirator must be washed after each day's use. If the respirator is shared it must also be disinfected according to the manufacturer's instructions. Organic solvents of any kind must not be used for cleaning. Air purifying filters must not be wetted.

1.4.2.1 CLEANING

1) Remove any filters, cartridges or canisters and, if required by the manufacturer, straps and speaking diaphragms from the facepiece. Remove regulators on airline or SCBA.

2) Wash respirator parts excluding cartridges and canisters in warm (not to exceed 140°F), soapy water or in a product specifically designed by respirator manufacturers for this purpose. A plastic bristle hand brush may be helpful in removing dirt from respirator parts.

3) Rinse all parts thoroughly in warm water.

4) Air dry all parts.

5) Reassemble the respirator and insert new cartridges if needed.

6) Place the respirator in a plastic bag or container and seal it for storage. The respirator facepiece should be stored in its normal position so as not to distort the elastomer.

1.4.2.2 DISINFECTION

1) Disinfection should be done with a cleaner/disinfection agent purchased from the respirator vendor. If that material is not available the following NIOSH procedures can be followed:

   a) Immerse the respirator body for two minutes in a 50 ppm chlorine solution (about 2 ml bleach to 1 liter of water). Rinse thoroughly in clean water and air dry.

   b) Immerse the respirator body for two minutes in an aqueous solution of iodine (add 0.8 ml of iodine in 1 liter water). The iodine is about 7% ammonium and potassium iodide, 45% alcohol and 48% water. Rinse thoroughly in clean water and air dry.

2) Immersion times have to be limited to minimize damage to the respirator. The solutions can age rubber and rust metal parts.

NOTE: The air-purifying elements must be removed from the respirator prior to cleaning and sanitizing the respirator. Never allow the air-purifying elements to come in contact with water or cleaning/sanitizing solution.

1.4.3 STORAGE

Respirators must be stored to protect them from contamination and mechanical damage at all times when not in use. New, cleaned or reconditioned respirators are to be kept in a clean, sealed plastic bag or container, stored in a normal position. The plastic bag should be labeled with the users name. A suitable cabinet or drawer should be used to protect respirators and supplies from dirt, extremes of temperature or bright sunlight. They are not to be left in vehicles or on site perimeter fences, in change sheds, etc.

APPENDIX C

HEAT STRESS AND COLD STRESS PROCEDURES

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1.0 COLD STRESS

1.1 OVERVIEW

Fatal exposures to cold have been reported in employees failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F, can be life threatening. A drop in core temperature to 95°F or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind-chill must be considered as it contributes to the effective temperature. The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from snow and possible skin burns from contact with cold metal.

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the Health and Safety Officer to monitor an individual, if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

1.2 PREDISPOSING FACTORS

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

- Dehydration: The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.
- Fatigue During Physical Activity: Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.

- Age: Some older and very young individuals may have an impaired ability to sense cold.
- Alcohol Consumption: Alcohol dilates the blood vessels near the skin surface resulting in excessive body heat loss.
- Sedative Drugs: Sedatives may interfere with the transmission of impulses to the brain, thereby interfering with the body's physiological defense against cold. Some prescription drugs may react the same way.
- Poor Circulation: Vasoconstriction of peripheral vessels reduces blood flow to the skin surface.
- Heavy Work Load: Heavy work loads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur.
- The Use of PPE: PPE usage which traps sweat inside the PPE may increase an individual's susceptibility to cold stress.
- Lack of Acclimatization: Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions.
- History of Cold Injury: Previous injury from cold exposures may result in increased cold sensitivity.

1.3 PREVENTION OF COLD STRESS

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules and employee education.

- Acclimatization: Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However, the physiologic changes are usually minor and require repeated uncomfortably cold exposures to induce them.
- Fluid and Electrolyte Replenishment: Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects

the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks and soup are good sources to replenish body fluids.

- Eating a Well-Balanced Diet: Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high energy foods throughout the day.
- Warm Clothing: It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.

The parts of the body most important to keep warm are the feet, hands, head and face. As much as 40 percent of body heat can be lost when the head is exposed.

Recommended clothing includes:

- Inner layers (t-shirts, shorts, socks) should be of a thin, thermal insulating material.
- Wool or thermal trousers. Denim is not a good protective fabric.
- Felt-lined, rubber-bottomed, leather-upper boots with a removable felt insole is preferred. Change socks when wet.
- Wool shirts/sweaters should be worn over inner layer.
- A wool cap is good head protection. Use a liner under a hard hat.
- Mittens are better insulators than gloves.
- Face masks or scarves are good protection against wind.
- Tyvek/poly-coated Tyvek provides good wind protection.
- Wear loose fitting clothing, especially footwear.
- Carry extra clothing in your vehicle.
- Shelters with heaters should be provided for the employees' rest periods if possible. Sitting in a heated vehicle is a viable option. Care should be taken that the exhaust is not blocked and that windows are partially open to provide ventilation.
- At temperatures of 30°F (-1°C) or lower, cover metal tool handles with thermal insulating material if possible.

- Schedule work during the warmest part of the day if possible, rotate personnel and adjust the work/rest schedule to enable employees to recover from the effects of cold stress.

1.3.1 EMPLOYEE EDUCATION

Employees have already been trained to recognize and treat the effects of cold stress during their 40-hour training. Signs, symptoms and treatment of cold stress should be reviewed in project safety meetings where applicable. The buddy system will help in preventing cold stress once the employees are trained to recognize the signs and symptoms of cold stress.

1.3.2 COLD STRESS PREVENTION GUIDELINES

It may not be practically feasible to implement all the above prevention measures. Follow the guidelines given below when the ambient air temperature is -5°F (-20°C) or lower:

- Contact the project manager or the industrial hygienist to determine if the project team should be on-site in such temperatures;
- Dress warm;
- Replenish fluids and electrolytes at regular intervals;
- Provide shelter from the cold; and
- Adjust work/rest schedules.

1.3.3 ADJUST WORK-REST SCHEDULES

Follow the work/rest schedule on Table C.1. It is based on the cooling power of air which is a function of wind speed and ambient air temperature.

1.4 FIRST-AID TREATMENT GUIDELINES

The following describes symptoms of different stages in cold stress and the related first-aid treatment guidelines.

1.4.1 FROSTBITE

Stages

Incipient (frost nip)	*May be painless. Tips of ears, nose, cheeks, fingers, toes,* chin affected. Skin blanched white.
Superficial	Affects skin/tissue just beneath skin; turns purple as it thaws. Skin is firm, waxy; tissue beneath is soft, numb.
Deep	Tissue beneath skin is solid, waxy, white with purplish tinge. Entire tissue depth is affected.

First-Aid

Incipient	Warm by applying firm pressure - blow warm breath on spot or submerge in warm water (102°F to 110°F) (39°C to 43°C). Do not rub the area.
Superficial	Provide dry coverage, steady warmth; submerge in warm water.
Deep	Hospital care is needed. Do not thaw frostbitten part if needed to walk on. Do not thaw if there is danger of refreezing. Apply dry clothing over frostbite. Submerge in water; do not rub.

1.4.2 GENERAL HYPOTHERMIA

Stages

- Shivering
- Indifference
- Decreased Consciousness
- Unconsciousness

- Death

Symptoms

- Muscle Tension
- Uncontrollable Shivering
- Glassy Stare
- Decreased Muscle Function
- Speech Distortion
- Blue, Puffy Skin
- Slow Pulse
- Shallow Breathing
- Coordination Loss
- Stumbling
- Forgetfulness
- Freezing Extremities
- Dilated Pupils
- Fatigue

Emergency Response

- Keep person dry; replace wet clothing
- Apply external heat to both sides of patient using available heat sources, including other bodies.
- Give warm liquids - not coffee or alcohol - after shivering stops and if conscious.
- Handle gently.
- Transport to medical facility as soon as possible.
- If more than 30 minutes from a medical facility, warm person with other bodies.

2.0 HEAT STRESS

2.1 OVERVIEW

Heat induced occupational illnesses, injuries and reduced productivity occur in situations in which the total heat load (environmental plus metabolic) exceeds the body's capacities to maintain normal body functions without excessive strain. Heat stress is the sum of the heat generated in the body plus the heat gained from the environment minus the heat lost from the body to the environment. The body's response to heat stress is called heat strain. The level of heat stress at which excessive heat strain will result depends on the heat tolerance of the individual. Certain predisposing factors may reduce an individual's ability to tolerate heat stress.

Using PPE may put a hazardous waste worker at an increased risk of developing heat stress. Health effects may range from heat rash or heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions such as temperature and relative humidity, protective clothing which limits natural heat loss through perspiration, workload and the individual characteristics of the worker.

It is the responsibility of the project team members to inform the HSO or industrial hygienist if any of the predisposing factors listed below apply to them. This enables the HSO to monitor the individual if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a heat related illness or disorder.

2.2 PREDISPOSING

Predisposing factors that will increase the individual's susceptibility to heat stress are listed below:

- Lack of Physical Fitness: Such individuals experience more physiological strain including a higher heart rate, a higher body temperature, less efficient sweating and slightly higher oxygen consumption as compared to fit individuals.
- Obesity: Overweight individuals produce more heat per unit surface area than thin individuals and have a lowered ability to dissipate heat.
- Age: Older individuals may have a decreased ability to cope with heat stress.

- Dehydration: Dehydrated individuals will have a decreased ability to cool the body by sweating. Diarrhea can cause dehydration.
- Alcohol, Medications and Drug Use: Alcohol consumption may dehydrate individuals and certain medications/drugs may act as diuretics. Hence, the individual may have a decreased ability to lose heat by sweating.
- Infection, Sunburn, Illness and Certain Chronic Diseases: These factors may interfere with the body's normal mechanisms to lose heat.
- Heart Conditions or Circulatory Problems: Heat stress may place an additional strain on the heart and circulatory system that could harm the individual as well as decrease the individual's physiologic response.
- Low Salt Diet: Could affect the individual's electrolyte balance.
- Pregnancy
- Previous History of Heat Stroke or Heat Exhaustion: May increase the individual's susceptibility to heat stress.
- Heavy Work Load: Will generate metabolic heat thereby increasing the heat stress placed on the individual
- The Use of PPE Over Light Summer Clothing: This will decrease the ability of an individual to lose heat by sweating as evaporative cooling can no longer occur.
- Lack of Acclimatization: Acclimatization is the gradual introduction of workers into a hot environment to allow their bodies to physiologically adjust to hot working conditions. Acclimatized individuals generally have lower heart rates and lower body temperatures. In addition, they sweat sooner and more profusely and even have more dilute sweat (thereby losing less electrolytes) than non-acclimatized individuals.

2.3 PREVENTION OF HEAT STRESS

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing heat stress related disorders. These include fluid and electrolyte replenishment, the provision of shelter from the sun and heat, work schedule adjustment, the use of cooling devices, acclimatization, heat stress monitoring and employee education, as discussed below:

- Fluid and Electrolyte Replenishment: Personnel should drink about 16 ounces of water before starting work and drink water at every break. To encourage water

consumption, cool water and disposable cups should be made available. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, personnel should be encouraged to drink more. Replacing body fluids with Gatorade is an option. It is advisable to have Gatorade on-site if the air temperature is 70°F (21°C) or more and the workers are performing tasks with a moderate to heavy work load in chemical resistant clothing.

- Shelter From the Sun and Heat: Air-conditioned (if possible) or shaded areas should be made available for rest periods. Sitting in an air-conditioned truck is an acceptable option.
- Work Schedule Adjustment: Scheduling work for early mornings and/or late afternoons will avoid the hottest parts of the day and reduce the heat stress placed on personnel. Rotation of personnel will help reduce overexertion of workers and adjusting the work-rest schedule will help personnel recover from the effects of heat stress periodically.
- Use of Cooling Devices: The use of cooling devices like field showers, hose-down areas or cooling vests should be considered for project tasks that involve heavy work loads in chemical resistant clothing.
- Acclimatization: Acclimatization is the gradual introduction of workers into a hot environment to allow their body to physiologically adjust to hot working conditions. Acclimatized individuals generally have lower heart rates and lower body temperatures. In addition, they sweat sooner and more profusely and even have more dilute sweat (thereby losing less electrolytes) than non-acclimatized individuals.
- Heat Stress Monitoring: Monitoring hot environments for potential heat stress should be initiated when the ambient air temperature is in excess of 70°F (21°C). There are several ways to monitor heat stress: measuring heart rate, oral temperature, loss of body weight and the Wet Bulb Globe Temperature using a Reuter-Stokes or Quest Electronics heat stress monitor.
- Employee Education: Workers have already been trained to recognize and treat the effects of heat stress during the 40-hour training course. Signs, symptoms and treatment of heat stress should be discussed in site safety meetings. The buddy system will help in preventing heat stress once the employees are trained to recognize the signs and symptoms of heat stress.

2.3.1 PREVENTION PRACTICES

It may not be practically feasible to implement all of the above prevention measures. The following has been developed as a field guide for use in actual field situations.

Ambient air temperature is 70°F (21°C) or more:

- Replenish fluids and electrolytes. Drink cool (50°F to 60°F/10°C to 15°C) fluids hourly. The fluids should be caffeine-free and non-alcoholic. Do not wait until you are thirsty. Your normal thirst mechanism is not sufficient to overcome the effects of dehydration. If you feel thirsty, you are already becoming dehydrated.
- Provide shelter from the sun and heat.

Ambient air temperature is 70°F (21°C) or more and chemical-resistant clothing is being used:

- Same as above;
- Adjust work schedules if feasible; and
- Initiate heat stress monitoring and/or the use of cooling devices.

2.3.2 HEAT STRESS MONITORING

Heat stress monitoring may be performed by monitoring the heart rate. Heart rate should be measured at the beginning of the work shift, at regular intervals and at the start of each rest period.

1) If the heart rate is <110 beats per minute (bpm), personnel may continue the current work/rest schedule.
2) If the heart rate is >110 bpm, take a 10 minute break. Monitor heart rate at the end of the rest period. If not <110 bpm, rest until the heart rate is <110 bpm. Reduce the current work time between breaks by approximately one hour. If the next scheduled monitoring session shows a heart rate of >110 bpm once again, reduce the work time between breaks by one hour.

2.4 HEAT STRESS FIRST AID

2.4.1 HEAT CRAMPS

Cause: Excessive water loss/electrolyte imbalance.

Symptoms	First-Aid Guidelines
Muscular pain in arms, legs, abdomen Faintness, dizziness, exhaustion Normal temp, cool moist skin person	Administer sips of Gatorade (1/2 glass every 15 minutes) Do not massage cramping muscles Relax

2.4.2 HEAT EXHAUSTION

Cause: Large amount of water loss; blood circulation diminishes.

Symptoms	First-Aid Guidelines
Moist, clammy, skin, usually pale Dilated pupils Weak, dizzy, nauseous, headache Normal or low body temperature	Move to a cool place Apply cold, wet compresses to skin Raise feet 8 to 12 inches Administer sips of Gatorade (1/2 glass every 15 minutes) Get medical attention

2.4.3 HEAT STROKE

Cause: Body overheats; temperature rises; no sweating occurs

Symptoms	First-Aid Guidelines
No sweating occurs	Get emergency medical assistance ASAP
Dry, hot skin, usually red	Remove from sunlight
Constricted pupils	Wet down body with cool water or rubbing alcohol
Hot body temperature (105°F to 110°F/40.5°C to 43.5°C)	Elevate head/shoulders
Strong, rapid pulse	Wrap in wet, cold wrapping
Unconsciousness may occur	Once cooled to 102°F (38.9°C), stop cooling measures
Muscular twitching	

APPENDIX D

SEVERE WEATHER EMERGENCY PROCEDURES

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SEVERE WEATHER

1.0 SCOPE

As most projects are conducted outside, the potential for severe weather must be considered. Thunderstorms, tornadoes, and winter storms can develop quickly, jeopardizing worker safety. The following emergency procedures are to be followed in case of severe weather.

2.0 THUNDERSTORMS AND LIGHTNING

Monitor weather conditions at all times while working. Monitor for a sign of an impending storm such as increased cloudiness, darkened skies, and increased wind. If any of these signs are observed, listen to a radio for the latest weather information or contact a local weather reporting service.

When a thunderstorm accompanied by lightning is in the project area, cease work immediately. All powered equipment, such as drill rigs, are to be shut down.

Seek shelter inside nearby buildings or trailers. If there are no buildings nearby, seek shelter inside your vehicle.

If you are caught outside, do not stand beneath tall, isolated trees or telephone poles. Avoid areas projecting above the landscape such as hill tops. In open areas, go to a low place such as a ravine or valley. Stay away from open water, metal equipment, wire fences, and metal pipes. If you are in a group of people in the open, spread out, staying several yards apart.

If you are caught in a level field or open area far from shelter and you feel your hair stand on end, lightning may be about to strike you. Drop to your knees and bend forward, putting your hands on your knees. **DO NOT LIE FLAT ON THE GROUND.**

If someone has been struck by lightning, monitor life signs and begin administering mouth-to-mouth resuscitation or cardiopulmonary resuscitation as needed. Send for help. Check conscious victims for burns, especially at the fingers and toes and next to buckles and jewelry. Administer first aid for shock. Do not let the victim walk around.

3.0 TORNADOES

Tornadoes usually develop from thunderstorms and normally occur at the trailing edge of the storm. Most tornadoes occur in the months of April, May, June, and July in the late afternoon and early evening hours.

When storms are predicted for the project area, monitor weather conditions on a radio. A tornado watch is issued when favorable conditions exist for the development of a tornado. A tornado warning is issued by the local weather service office whenever a tornado has actually been sighted or is strongly indicated by radar.

If a tornado warning is issued, seek shelter immediately. If there are permanent buildings located on site, go there immediately, moving toward interior hallways or small rooms on the lowest floor.

If a tornado warning is issued and you are in a vehicle or a site trailer, leave and go to the nearest building. If there are no buildings nearby, go in the nearest ditch, ravine, or culvert, with your hands shielding your head.

If a tornado is sighted or a warning issued while you are in open country, lie flat in a ditch or depression. Hold onto something on the ground, such as a bush or wooden fence post, if possible.

Once a tornado has passed the site, site personnel are to assemble at the designated assembly area to determine if anyone is missing. Administer first aid and seek medical attention as needed.

4.0 WINTER STORMS

When snow or ice storms are predicted for the project area, site personnel should monitor weather conditions on a radio. A winter storm watch is issued when a storm has formed and is approaching the area. A winter storm warning is issued when a storm is imminent and immediate action is to be taken.

When a storm watch is issued, monitor weather conditions and prepare to halt site activities. Notify the project manager (PM) of the situation. Seek shelter at site buildings or leave the site and seek warm shelter. If you are caught in a severe winter storm while traveling, seek warm shelter if road conditions prevent safe travel.

If you are stranded in a vehicle during a winter storm:

- STAY IN THE VEHICLE, disorientation comes quickly in blowing and drifting snow;
- wait for help;
- keep a window open an inch or so to avoid carbon monoxide poisoning;
- run the engine and heater sparingly;
- keep watch - do not let everyone sleep at the same time; and
- exercise occasionally.